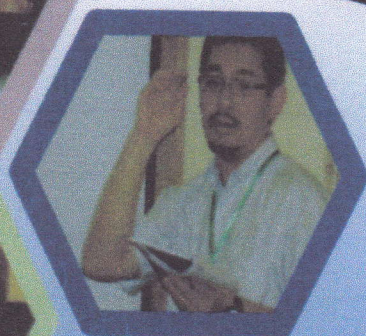


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Blood Chemistry Data Base of Kedu Chicken - The Indonesian Indigenous Poultry

Sri Susanti^{a*}, Rina Muryani^a, Isroli^a, Hanny Indrat Wahyuni^a, Agus Sucipto^b

Abstract

Kedu chicken is the Indonesian indigenous poultry with the potential distribution and a large population. Thus it needs special attention to raise the value of its product commercialization and empowerment as an important sector that not only can support the food security but also can establish the national food sovereignty. Many investigations have been addressed either to improve Kedu chicken productivity or to support of its conservation purpose; however the existence of complete base data especially the blood chemistry is limited. The blood chemistry status is one of the important parameters in the productivity aspects. Therefore its availability is very required in order to give the scientific basic regarding the various studies topic involving Kedu chicken. This current study was aimed to devote the blood chemistry data base of Kedu chicken i.e. concentration of glucose, total cholesterol, LDL, HDL, triglycerides, SGPT, SGOT and blood minerals (sodium, phosphate, iron, calcium, and potassium). Glucose concentration was measured by blood sugar test meter directly after 2 hours sample collection while total cholesterol, LDL, HDL, triglycerides, SGPT, SGOT and phosphate concentration were determined by using spectrophotometer method. Furthermore, others blood mineral concentration (sodium, ferrum, calcium and potassium) were measured by using the Atomic Absorption Spectrophotometer (AAS) method. Concentration of HDL, triglycerides, SGPT, SGOT, potassium, sodium and calcium are significantly different while the concentration of blood glucose, total cholesterol, LDL, phosphate and iron are not significantly different between male and female Kedu chicken. The data base in this study was expected can become an attempt to improve the potency and conservation toward Kedu chicken as one of the Indonesian germplasm.

Keywords: Blood.Chemistry. Data Base.Kedu Chicken

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Introduction

Kedu Chicken is one of Indonesian indigenous chickens. It is a conventional farm animal that is widely cultivated in almost all parts of Indonesia. This reality was shown by population of 300 million native chickens co-exist with approximately Indonesia's population of 250 people (Rasyaf, 2002). Based on the potential distribution and a large population, they needs extra attention to raise the value of its product commercialization and empowerment as an important sector that not only can support the food security but also can establish the national food sovereignty.

Recently it has been conducted a lot of investigations on Kedu chicken either to increased its productivity or

conservation purposes. On behalf of health-related productivity improvement research, the blood status especially blood chemistry, merits become one of the important parameters as indicators of the treatment. However, the availability of complete base data on blood chemistry has not been clearly documented. So far the data existence is limited on the performance, phylogenetics description and characteristics of Kedu chicken (Sartika et al., 2004), whereas the references about base data of blood performance are still limited on the physiological hematology solely (Isroli et al., 2009). As we know, the existence of a base data is indispensable in providing the scientific basic for further study involving a variety of treatments.

Therefore this study was aimed to provide the blood chemistry data base of Kedu chicken (concentration of

glucose, total cholesterol, LDL, HDL, triglycerides, SGPT, SGOT and blood minerals) as one of the Indonesian local livestock in order to increase the productivity and conservation of Indonesian chicken. Availability of blood chemistry data base is looked forward to support the valuable scientific information which triggers the various further study in the future especially some studies that lead the productivity improvement and conservation of Kedu chicken.

Methodology

This study used 32 weeks old of male and female Kedu chicken with total amount 10 respectively (n=10). That population was determined from 200 population of Kedu chicken in intensively maintenance. Individual uniformity in order to get the small variation in the data was carried out by isolating the chicken for 2 weeks before sample collection. All chicken were maintained in the battery cage and fed by a standard feed. Blood collection tools were used in this investigation such are spuit 3 cc, blood collection tube with EDTA as an anticoagulant, cooler box, stationery and camera for documentation.

Preparation of blood collection

Blood collection was performed on 20 population of Kedu chicken after they were fasted for 10 hours. Location of blood collection is cephalic vein with 2 cc of blood total volume. Furthermore, plasma/serum was produced from the blood samples for analysis of blood chemistry profile such as concentration of glucose, total cholesterol, LDL, HDL, triglycerides, SGPT, SGOT and blood minerals (sodium, phosphate, iron, calcium, and potassium).

Blood glucose

Examination of blood glucose concentration was performed by using digital glucometer according to the manufacturer's instructions (Accu-check active, Roche, German). Briefly, blood sample was dripped into the middle part of glucose strip (orange area) then inserted to the glucometer cleft according to the arrow direction until locked position. Data appeared on the glucometer screen was noted as blood glucose concentration in mg/dl.

Total blood cholesterol

Plasma, standard solution and distilled water (blank) 10 µl were mixed with reagent cholesterol 1000 µl until homogeneous, respectively. After incubation for 20 minutes in room temperature, cholesterol concentration was measured by using spectrophotometer (Microlab 300, Merck, German) at the wavelength of 546 nm. Cholesterol concentration was determined by sample absorbent divided by standard absorbent and its result was multiplied with the standard solution concentration (200mg/dl).

LDL and HDL concentration

For sample precipitation 25 µl of plasma was added to 250 µl of 500 LDL or 250 HDL precipitating solution until homogeneous. After incubation on the room temperature for 15 minutes, precipitating solution was centrifuged (12.000 rpm for 2 minutes). 100 µl of formed supernatant, blank and standard solution were added into 1000 µl of cholesterol reagent until homogeneous respectively. Each solution was measured by using the spectrophotometer at the wavelength of 540 nm (Microlab 300, Merck, German) after incubation on the room temperature for 10 minutes. Concentration of supernatant cholesterol was determined by dividing sample absorbent with standard absorbent then the result was multiplied with concentration of standard solution (200mg/dl). LDL or HDL concentration were determined by total cholesterol concentration minus supernatant cholesterol concentration resulted from the precipitation process.

Triglyceride concentration

Blood triglyceride concentration was assayed by using GPO method- enzymatic photometric. 10 µl of plasma, blank and standard solution were added to 1000 µl of triglyceride reagent until homogeneous respectively. After incubation for 20 minutes in room temperature, triglyceride concentration was measured by using spectrophotometer (Microlab 300, Merck, German) at the wavelength of 540 nm. Triglyceride concentration was determined by sample absorbent divided by standard absorbent and its result was multiplied with the standard solution concentration (200mg/dl).

Phosphate concentration

Reagent for measuring blood phosphate concentration was made by mixing 4 parts of reagent 1 and 1 part of reagent 2 become mix reagent. 10 µl of plasma, blank and standard solution were added to 1000 µl of mix reagent until homogeneous respectively. After incubation for 5 minutes in room temperature, phosphate concentration was measured by using spectrophotometer (Microlab 300, Merck, German) at the wavelength of 340 nm. Phosphate concentration was determined by sample absorbent divided by standard absorbent and its result was multiplied with the standard solution concentration (5mg/dl).

Iron, calcium, potassium and sodium concentration

Iron, calcium, potassium and sodium concentration were measured by using Atomic Absorption Spectrophotometer (AAS) method. 5 ml of HNO₃ solution was added into 0.5 ml of serum then it was destructed in the heater plate until the liquid colour looked like tea liquid. After cooling down at the room temperature, the solution was added into 1 ml of

HClO₄ and destructed till yellow colour disappeared and then mixed by 15 ml of distilled water. Solution was filtered to 50 ml Erlenmeyer tube and then was added by distilled water again till indicated scale. Each mineral concentration was read by using AAS with adjusting the instrument at the certain wavelength properly.

SGPT and SGOT

SGPT and SGOT concentration of serum were measured by using UV-Vis-NIR Spectrophotometer according to the manufacturer's instructions (UV-3600, Shimadzu, USA). Briefly, reagents were made by mixing 5 parts of reagent R1 and 1 part of reagent R2 become mix reagent. 10 µl of plasma, blank and standard solution were added to 1000 µl of mix reagent until homogeneous respectively. After incubation for 1 minute in room temperature, phosphate concentration was measured by using spectrophotometer at the wavelength of 365 nm. SGPT and SGOT concentration was determined by sample absorbent divided by standard absorbent and its result was multiplied with the standard solution concentration (3235).

Results and discussion

The role of blood is relatively complex in animal life considering its correlation to the livestock productivity. The better blood status the healthier livestock and healthy is a prerequisite for livestock to carry out their productivity. Therefore, in several investigations that were aimed to the productivity improvement, blood status was often used as one of parameter to get more insight the presence of responds come from the treatment. Thus, the availability of blood data base of the species possesses the meaningful thing. It can be an accurate and valid comparison towards the data resulted from the research. In order to evaluate the blood status of livestock usually was separated as blood physiological and blood chemistry status. Observation of blood chemistry is the laboratory examination based on the chemical reaction that occurred in the blood sample (Rosenfeld, 2002).

This study demonstrates about several parameters related to the blood chemistry of Kedu chicken such as concentration of glucose, total cholesterol, LDL, HDL, triglycerides, SGPT, SGOT and blood minerals (sodium, phosphate, iron, calcium, and potassium). All those data were compiled as the blood chemistry data base in accordance with the chicken sex (Table 1). Concentration of HDL, triglycerides, SGPT, SGOT, potassium, sodium and calcium are significantly different while the concentration of blood glucose, total cholesterol, LDL, phosphate and iron are not significantly different between male and female Kedu chicken. Blood HDL concentration of female is significantly higher than male Kedu chicken ($p <$

0.01). In the community, cultivation of Kedu chicken has some purposes in which not only for meat but also egg consumption. High level of blood HDL in female will be a good impact to the chemical composition of chicken egg. As we know that HDL is the well-behaved "good cholesterol" which has much benefit to the human health (Brouwer et al., 2010). Blood triglyceride level of male as shown in the Table 1 is significantly higher than female ($p < 0.01$). From the chemistry point of view, triglyceride consists of 3 fatty acids bound glycerol molecule. It is the normal component of the blood that very important for the normal function of the body and the energy source for the daily activity (Klotzsch and McNamara, 1990), thus male Kedu chicken has look more active and aggressive physically than female. Furthermore, SGPT and SGOT level of male Kedu chicken is significantly higher than female as an indication of metabolism intensity. Both SGPT and SGOT is mitochondria enzyme that catalyses the reverse transfer of amino acid groups from aspartate to α -oxaloacetate acid build glutamate acid and oxaloacetate that play an important role in energy metabolism (Cohen and Kaplan, 1979).

Table 1. Data base of blood chemistry status of male and female Kedu chicken that is expressed as mean \pm deviation standard of 10 sample (n=10). * $p < 0.01$ male versus female.

Parameter of Blood Chemistry	Male	Female
Glucose (mg/dl)	225.53 \pm 10.15	220.26 \pm 6.67
Total Cholesterol (mg/dl)	109.93 \pm 6.00	114.87 \pm 5.61
LDL (mg/dl)	51.10 \pm 9.45	53.54 \pm 5.43
HDL (mg/dl)*	23.41 \pm 3.17	26.6 \pm 2.37
Triglyceride (mg/dl)*	79.30 \pm 7.68	63.00 \pm 14.19
SGOT (U/L)*	149.84 \pm 13.99	125.53 \pm 6.38
SGPT (U/L)*	79.54 \pm 3.61	61.01 \pm 3.60
Phosphate (ppm)	0.32 \pm 0.08	0.31 \pm 0.05
Iron (mEq/L)	0.26 \pm 0.08	0.26 \pm 7.46
Potassium (mEq/L)*	107.76 \pm 7.25	84.13 \pm 2.91
Sodium (mEq/L)*	314.63 \pm 16.61	270.24 \pm 7.46
Calcium (mEq/L)*	3.80 \pm 0.12	5.49 \pm 0.23

Moreover, there are so many chemical elements inside the body and 0.9 % of blood plasma or serum composition is mineral. In Table 1 of this study demonstrated 5 blood essential minerals of Kedu chicken include sodium, phosphate, iron, calcium, and potassium. From the fifth minerals level measured in this study, only 3 kind of mineral show the significant differences in the blood serum level between male and female Kedu chicken such as sodium, potassium

calcium. It is noteworthy that blood calcium level in female is significantly higher than male as a consequence of female attribute as egg producer ($p <$

availability the data base about blood chemistry is looked forward to devote the valuable specific information for triggering further various investigations in the future, especially studies that contribute to the productivity improvement and nutrition of Kedu chicken as one of the wealth of Indonesian germ plasma that merits revealed about its potency. Therefore, some further studies in order to create another data base is necessary to be done.

Conclusion

Concentration of HDL, triglycerides, SGPT, SGOT, sodium and calcium are significantly different while the concentration of blood glucose, cholesterol, LDL, phosphate and iron are not significantly different between male and female Kedu chicken. The data base in this study was expected can be used as an attempt to improve the potency and nutrition toward Kedu chicken as one of the Indonesian germ plasma.

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